

College & Career Awareness

Program Area(s): Information Technology
Lesson Plan Title: 3D Modeling Create a 3D model of a chair using software, such as Google SketchUp or 123D Design.
Estimated Time: 90 minutes
Primary CTE Pathway(s) Explored: Digital Design and Programming/Software Development.
Intended Learning Outcome(s): <ul style="list-style-type: none"> • Become acquainted with a wide range of occupational areas (pathways), CTE Pathways, and trends in career opportunities including emerging careers. • Become acquainted with entry to expert career pathways for entry to expert career readiness. • Participate in experiential activities related to career expectations. • Consider and Explore nontraditional career opportunities. • Understand the relationship of cross cutting concepts/integration/cross disciplinary concepts.
College and Career Awareness Standard, Objective(s): Standard 7, Objective 1
Cross Curriculum Integration: Commercial Art, Design Technology, Graphics/Printing, Machine Tool, Pre-Engineering <ul style="list-style-type: none"> • 21st Century or Interpersonal Soft Skills: Uses critical thinking, creativity, problem-solving, and communication technology. • Engineering: With most engineering fields, 3 dimensional design technology is used to help engineers plan and design infrastructures, buildings, and components. • Math – 3D drawing activity: G1-solve problems involving scaled geometric figures, and G2-draw geometric shapes with given conditions. • Math: Learning how to draw in three dimensional space uses math x, y, and z coordinate systems. There is also converting from inches to millimeters, using addition and subtraction of lengths. • Technology: Many technologies require understanding of 3 dimensional spaces and how to manipulate virtual objects in space. Anything from video game design, to interior design, to industrial design, and to architectural design are relying more and more on 3 dimensional modeling software. • Writing – Career Exploration: W2-write Informative text, W4-produce clear and coherent writing, and W6-Use technology.
Career Opportunities in the CTE Pathway(s): Construction managers, industrial production managers, architects civil engineers, industrial machinery mechanics, radiologic technologists and technicians, diagnostic medical sonographers, graphic artists, drafters, animators, interior designers, landscape architects, set and exhibit designers, video game designers
Nontraditional Career Opportunities: Construction managers, industrial production managers, architects, civil

engineers, industrial machinery mechanics, drafters
STEM Specific Career Opportunities: Aerospace engineers, aircraft mechanics, civil engineers, construction managers, drafters, electrical engineers, industrial engineers, mechanical engineers, science technicians, validation engineers
Methods (Approach to Teaching and Learning): <ul style="list-style-type: none"> • Direct Instruction and Demonstration • Activity/Inquiry/Practice Centered Instruction
Materials Needed: <ul style="list-style-type: none"> • Computer lab with a 3D design software installed (Google SketchUp or similar software) • 123D Design • iPad app)
Vocabulary: <ul style="list-style-type: none"> • Cube • Cylinder • Extrude (push/pull) • Orbit • Pan • Plane • Sphere • X, Y, Z coordinates • Zoom
Prior Knowledge: <ul style="list-style-type: none"> • Students should know what a coordinate system is and how space can be divided into three directions. • Students should be familiar with the basic 3D forms—cube, cylinder, and sphere.
Instructional Procedures: Create a 3D model of a chair Background Begin with a discussion of 3D space. Explain what the x, y, and z coordinate system is. Review the vocabulary for moving objects in space—pan, zoom, and orbit. Review what basic objects are in 3D modeling—spheres, cubes, and cylinders. Many models can be broken down into some of these basic shapes. <ol style="list-style-type: none"> 1. Introduce the 3D modeling software you are using. You may do this with direct demonstration or use the following videos, if accessible. Have students view these basic steps prior to working with modeling software. 2. Guide students through creating the example in the folder included with this lesson. <ol style="list-style-type: none"> a. After starting up the 3D modeling software change the view to the isometric or 3D view. b. Draw a rectangle and extrude it up (push/pull). c. Draw a rectangle from the top left corner of the box and push/pull it to cut out the seat of the chair. d. Draw a rectangle in the middle of the right side and push/pull it to cut out the bottom under the seat and between the legs. e. Draw a rectangle in the middle of the front side and push/pull it to cut out the bottom under the seat and complete the legs. f. Draw an arc or an ellipse on the top of the chair back and push/pull it to create the rounded top of the chair. g. Add the material of your choice to the model to give it some texture.

3. [Untangling The Hairy Physics Of Rapunzel](#)

Extensions

1. Students scan and create a model of their choosing.
2. If you have a 3D printer and can allow it, have the students create a small model that could be produced by the 3D printer.
3. Have the students create a 3D model of their name and include a texture or add a material to the object.

Videos

- [123D Design – Creating Your First Object](#)
- [123D Design – Moving, Snapping, Cruising](#)
- [123D Design – Edges, Faces and Points](#)
- [Google SketchUp Beginner Tutorial](#)
- [Google SketchUp – New Users 1: Concepts](#)
- [Google SketchUp New Users 2: Drawing Shapes](#)
- [Google SketchUp New Users 3: Push/Pull](#)
- [Google SketchUp New Users 4: Create a Chair](#)

Additional Resources:

- Create a 3D model of a table with multiple chairs around it.
- Create a 3D model using text and your name
- Create a 3D model of a character in a book

Assessment(s):

- Critical thinking demonstration (written, oral, or through demonstration or performance).
- Develop a portfolio of artifacts documenting concepts learned.